Center Independent Research & Development: GSFC IRAD

NanoComposite Polymers for High Resolution Near Infrared Detectors

Completed Technology Project (2011 - 2015)

Project Introduction

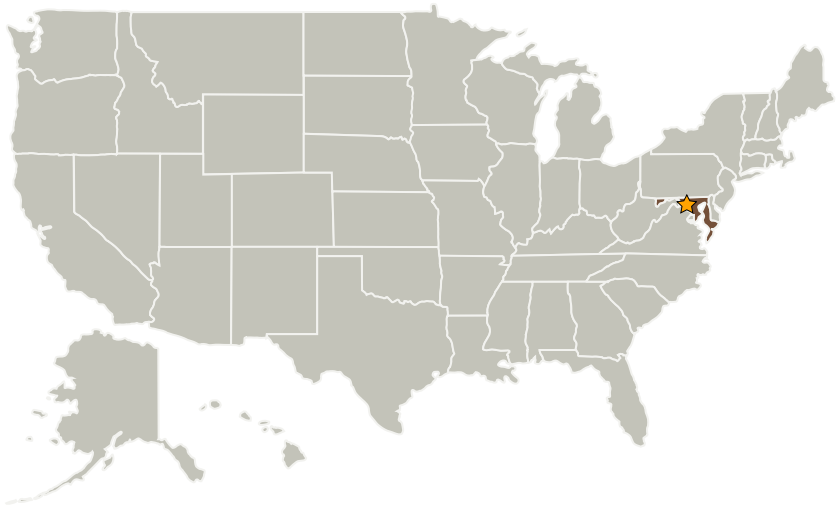
Develop nanocomposite materials with tuned refractive index in the near infra red spectral range as an index-matched immersion lens for high resolution infra-red detectors. By optically contacting an anti-reflection lens to the detector, the full range of incidence angles in vacuum map into a relatively narrow range of angles in the detector. This increases the signal by a factor of n2 without increasing noise and reduces observing time by a factor of n4.

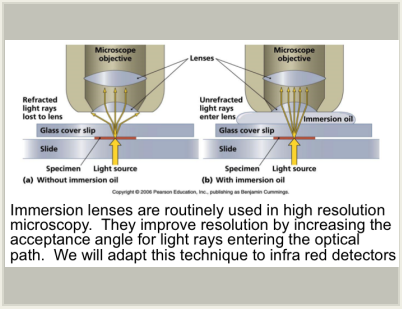
The tasks include researching polymer epoxy materials with low CTE that can be mixed with non polar solvents; research nano-particle materials with high index of refraction and develop methods for mixing with polymer matrix without agglomeration. Procure candidate materials Select composite materials Fabricate test samples Optical testing CTE testing Refractive index as a function of filling factor will be measured with FTS.

Anticipated Benefits

N/A

Primary U.S. Work Locations and Key Partners





Immersion lenses are routinely used in high resolution microscopy. They improve resolution by increasing the acceptance angle for light rays entering the optical path. We will adapt this technique to infra red detectors

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations
Maryland

Project Transitions

October 2011: Project Start

September 2015: Closed out

Closeout Summary: The purpose of the Goddard Space Flight Center's Internal Research and Development (IRAD) program is to support new technology development and to address scientific challenges. Each year, Principal Investigators (PIs) submit IRAD proposals and compete for funding for their development projects. Goddard's IRAD program supports eight Lines of Business: Astrophysics; Communications and Navigation; Cross-Cutting Technology and Capabilities; Earth Science; Heliophysics; Planetary Science; Science Small Satellites Technology; and Suborbital Platforms and Range Services. Task progress is evaluated twice a year at the Mid-term IRAD review and the end of the year. When the funding period has ended, the PIs compete again for IRAD funding or seek new sources of development and research funding or agree to external partnerships and collaborations. In some cases, when the development work has reached the appropriate Technology Readiness Level (TRL) level, the product is integrated into an actual NASA mission or used to support other government agencies. The technology may also be licensed out to the industry. The completion of a project does not necessarily indicate that the development work has stopped. The work could potentially continue in the future as a follow-on IRAD; or used in collaboration or partnership with Academia, Industry and other Government Agencies. If you are interested in partnering with NASA, see the TechPort Partnerships documentation available on the TechPort Help tab. http://techport.nasa.gov/help

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Manager:

Terence A Doiron

Principal Investigator:

Kevin L Denis

Co-Investigators:

Manuel A Quijada
Samuel H Moseley
Manuel A Balvin

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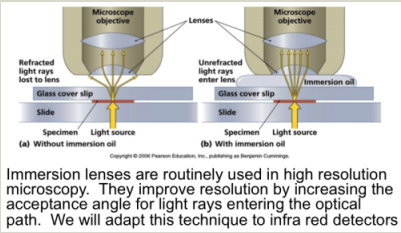
Images



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NanoComposite Polymers for High Resolution Near Infrared Detectors
(https://techport.nasa.gov/image/36710)

Links

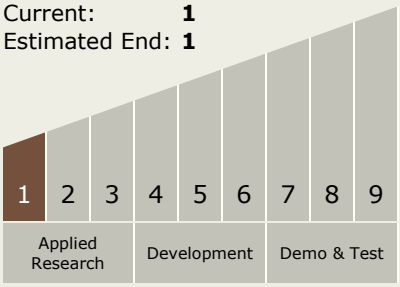
GSC-16496-1
(https://ntts.arc.nasa.gov/app/)

Project Website:

http://aetd.gsfc.nasa.gov/

Technology Maturity (TRL)

Start: **1**
Current: **1**
Estimated End: **1**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

Target Destination

Foundational Knowledge